

CHAPTER 5 – Fuel for Performance

SPORTS DRINKS, GELS, AND ENERGY BITES

"Gels, energy bites or sports drinks can be an effective way to supply the body with energy, but they are not necessary. Real food will provide the same benefit as these pre-designed workout fuels. Food and fluid intake around workouts should be determined on an individual basis with consideration for an athlete's gastrointestinal tract tolerance, as well as duration and intensity of the workout."

Academy of Nutrition and Dietetics Spokesperson Heather Mangieri, MS, RDN, CSSD
<http://www.eatright.org/resource/fitness/exercise/exercise-nutrition/how-to-fuel-your-workout>

In any activity, proper nutrition is important in an individual's performance. Walking or running—long or short—diet must give the right amount of energy from the right sources. Food sources supply protein for muscle mass, nutrients and micronutrients for energy, and liquid or water to move those nutrients and keep the body cool. The main difference in nutritional requirements between a hard runner and a casual runner is the quantity of energy and fluid intake.

Food taken before, during, and after activities influence performance. Having the appropriate diet supports a person's activities and helps him/her recover faster while lowering his/her risk of injuries. Eating well and staying in good health also keeps the person from acquiring illness.

PROPER NUTRITION FOR EXERCISE

Nutrition is the health branch that stresses the importance of the food for growth and development, as well as in lowering the chances of acquiring diseases and illness. Proper nutrition relies on the mix of food with varying nutrients that we need to eat every day. Having too much or too little of these nutrients can lead to illnesses. The key principles of nutrition are adequacy, balance, and variety.

What are nutrients? Why are they important?

Nutrients are important food substances that help our body function properly. It provides energy and facilitates growth and repair of cells. There are six types of nutrients: water, protein, carbohydrates, fats, vitamins, and minerals. They can be further classified into macronutrients and micronutrients.

Macronutrients such as carbohydrates, fats, proteins, and water are required by the body in large amounts. Micronutrients such as vitamins and minerals are only needed in very little amounts. They all help our bodies produce enzymes, hormones, and other substances critical to growth and development. There are different strategies that you can use to ensure that you are eating right such as the *Pinggang Pinoy* (Food and Nutrition Research Institute) and the *10 Kumainments* (National Nutrition Council).



What are the factors that can affect weight control?

In general, the complex interaction between internal and external factors is the reason for being obese. These *internal factors* are mainly body related like genetics and hormonal secretions. The *external factors*, however, directly influence weight management such as diet, physical activities, and social settings.

1. **Genetic Factors and Hormones.** There are some rare conditions of extreme obesity affecting about 1% of the population. These include syndromes like Prader-Willi and Baret-Biedl, which are genetic disorders present at birth. Obesity can also be related to hormones like leptin and ghrelin that depresses appetite and contributes to feelings of hunger, respectively.
2. **Environmental Factors.** Health care professionals focus on environmental factors during the treatment of overweight and obesity. Proper diet and exercise are the main measures to counter obesity. Controlling triggers of eating habits is essential during weight control. However, it will take some time overcoming these especially if they have become a routine or tradition in the family.
3. **The Concept of Energy Balance.** Energy balance is achieved when the amount of consumed calories equals the amount of calories used in order to maintain body weight. Taking more calories (eating more food) than what the body can burn makes an individual gain weight, while burning more calories than what is consumed will make him/her lose weight. Consequently, there should be a balance between the two to have a constant body weight. There are three factors that contribute to the total energy spent on a daily basis: basal metabolic rate, physical activity, and thermic effect of food. *Basal metabolic rate* refers to the energy spent by the body to maintain homeostasis (i.e., normal function). Aging decreases basal metabolic rate and this contributes to weight gain as people grow older. Energy is also spent every time the muscle contracts when we perform physical activities. People who are sedentary would eventually gain weight because their muscles are inactive most of the time. *Thermic effect of food* refers to the energy spent to digest the food. Eating complex carbohydrates increases digestion time and may help in increasing energy expenditure.

FAD DIETS AND SUPPLEMENTS

A diet that promises quick results with little effort easily earns and loses popularity shortly after consumers realize it as just a false advertisement. These kinds of diet are "fad," as they come and go. Any diet claiming instant results without exercise or reduction of calorie intake will not reduce body fat.

Here are guidelines for safe and nutritious diet:



"25 Pounds in Only 2 Weeks!"

Scientists Discover Rare Weight-Loss

- Eat food that are low in calories but provides all required essential body nutrients such as vitamins and minerals
- Fat should be less than 30% of total calories with high complex carbohydrates
- Variety of food to suit tastes and avoid hunger between meals
- Compatible with lifestyle and readily available
- Diet should be lifelong and sustainable

BIGGEST EATER

Nutrisystem

Weight Watchers

Jenny Craig

ATKINS

SOUTH BEACH diet

Day-to-Day Nutrition

Although the before, during, and after exercise diet is essential to an individual's performance, the day-to-day diet is more important. Overall dietary consumption for days, weeks, and months should be sufficient; otherwise, training and performance will be adversely affected. Basically, the body should meet the required daily energy to function well. The Department of Science and Technology (DOST) through the Food and Nutrition Research Institute (FNRI) came up with the Daily Nutritional Guide (DNG) Pyramid and the "Pinggang Pinoy" that contains the recommended daily and per meal food intake for each individual. This will help an individual in choosing the proper food combinations necessary in the nourishment of essential nutrients for the body.

PINGGANG PINOY



Did you know that...

According to FNRI, "Pinggang Pinoy"

- is a new and easy to understand food guide that uses a familiar food plate model to show the right food group proportions per-meal to meet the body's energy and nutrient needs of Filipino adults,
- can be used to complement the FNRI Daily Nutritional Guide (DNG) Pyramid for Filipinos, but will not replace it.
- is a "quick and easy guide" on how much to eat per meal compared to the DNG Pyramid that shows whole day food intake recommendation.

"Both the Pinggang Pinoy and the DNG Pyramid for Filipinos are based on the latest science about how our food, drink, and activity choices affect our health."

-DOST

Source: <http://www.dost.gov.ph/index.php/knowledge-resources/news/34-2014-news/567-fnri-s-pinggang-pinoy-to-guide-filipinos-on-how-much-to-eat-per-meal>

Exercise and training drives the body to the limit. Achieving progress would mean putting continuous stress on the body and letting it recover. However, recovery will not happen without proper nutrition. As the body continues to exercise, stress and fatigue, and metabolic waste continue to accumulate in the body. If a person is uncertain of his/her nutrition, he/she should see a doctor or a licensed dietitian to check and design the proper nutrition for training and exercise. The following are consequences of poor nutrition:

1. **Poor Performance.** Carbohydrates, fats, and protein provide the body big amounts of energy for exercise and competition. Insufficient intake will hinder it from peaking at the desired performance level. Resistance exercise depends on energy that carbohydrates give while endurance exercise needs fats and carbohydrates. Muscles break down their protein to power themselves during intense exercises.
2. **Long Recovery.** Exercise results in minor muscle damage. Consequently, the muscles repair and rebuild itself which results in growth in muscle mass and increased strength and endurance prevents muscle damage. According to nutritionist Dr. John Berardi, the first two hours after exercise are the most critical for exercise recovery. The high amount of required nutrition is high for the first 24 hours after exercise; failure to meet the demands delays the recovery for days or even weeks.
3. **Immune Suppression.** Stress hormones are produced in the body during exercise, triggering the body to release stored energy like body fat. But when the amount of stress hormones remains high, the immune system functions are compromised. Nevertheless, too much intake of carbohydrates, protein, and vitamins suppress the immune system that is why a balanced diet is important.
4. **Weight Changes.** Exercise and diet modification is used to alter weight. Crash diets and other fad diets do not support proper weight loss principles because both fat and muscle mass is lost. A good weight loss strategy should retain or improve muscle mass with a significant reduction in fat mass. Lastly, losing weight at an unhealthy pace will most likely lead to a weight rebound.



Dietary Supplement

Dietary supplements are substances that contribute to health maintenance and overall diet. These include vitamins, minerals, amino acids, enzymes, and animal extracts. Dietary supplements come in different forms, usually in tablets and capsules.

Benefits of Dietary Supplements

These supplements complement the dietary intake of essential nutrients and help reduce the risk of diseases. But these are not medicinal drugs intended to "cure" particular diseases.

Are there any risks in taking supplements?

Taking supplements has its risks. The active ingredients in supplements have strong biological effects on the body, which might harm or worsen an individual's health. Below are examples of improper intake of supplements, which may lead to dangerous or life-threatening consequences:

- combination of supplements;
- supplements combined with medications;
- taking supplements in replacement of prescription medicines;
- overdosage of certain supplements like vitamins A, D, and iron; and
- certain supplements can be dangerous before, during, and after surgery.

Hence, the best option is to "avoid" taking supplements unless prescribed by a licensed physician.

SUMMARY

Proper nutrition plays a big role in performing casual to heavy physical activities. Taking in nutrients is necessary before, during, and after such activities. It is also essential in the body's recovery, immunity from sickness, and maintenance of proper body weight. Nutrients (both macro and micro) are very important for the body to achieve proper mental and physical performances. Macronutrients like water, protein, carbohydrates, and fats are required by the body in large amounts while micronutrients like vitamins and minerals are only consumed in small amounts. These nutrients are consumed by the body during the performance of day-to-day activities and should be replenished through proper diet and nutrition. It is therefore important for each individual to prepare a daily, weekly, and monthly diet plan that enables the body to meet the required energy for mental and physical activities. The DNG Pyramid and the *Pinggag Pinoy* designed by the FNRI can serve as guide preparing this plan.

LET'S DO THIS!

Activity 1: Analyze

1. Why is it important to have a proper diet and nutrition?
2. Identify your bad eating habits and provide ways on how to correct these.
3. Why is carbohydrate intake important, especially for athletes?
4. List down five essential micronutrients and identify five possible food sources for each.

Essential Nutrients	Importance	Signs and Symptoms of Deficiency
Vitamin E and C	- Aid in bone, teeth, and skin formation and resistance to infection - Help protect the body from oxidative damage	Anemia, frequent infections, bleeding gums, loosened teeth, muscle degeneration and pain, joint pain, blotchy bruises, failure of wounds to heal
Folate	Aids in the formation of red blood cells and protein	Anemia, heartburn, frequent infections, smooth red tongue, depression, and mental confusion
Minerals	Help in regulating the chemical reactions in the body	<i>Sports Anemia</i> – a condition where temporary decrease in hemoglobin concentration occurs during exercise training.
Iron	- Helps in energy metabolism; important in transporting oxygen through the bloodstream; prevents anemia - Important during exercise for the formation of hemoglobin and myoglobin, other iron-containing proteins that are essential for energy production	Anemia, weakness, fatigue, pale appearance, reduced attention span, developmental delays in children
Calcium	- Helps build and maintain bones and teeth; nerve and muscle function and blood clotting - Needed to maintain blood calcium levels and promote bone density, consequently reducing the risk of osteoporosis	Stunted growth
Zinc	Helps carry out body processes; plays a role in immune function, protein synthesis, and wound healing	Growth failure, delayed sexual maturation, slow wound healing

Table 5.1. Essential Nutrients, Its Importance, and Deficiency Signs and Symptoms

Before Exercise

The food eaten before exercise serves as the energy source and will define one's performance. Eating a meal with plenty of carbohydrates three to four hours before exercising is ideal as it increases the blood glucose and glycogen levels for energy. A moderate amount of protein helps recovery after exercise. The meal should be low in fat and fiber so as not to have digestive or stomach problems.

Carb loading or "carbo loading" is a strategy used by runners to maximize carbohydrate intake for muscle energy storage in preparation for a long run or race.

(Source: <http://www.runnersworld.com>)

Glucose – sugar that is broken down into energy. Glycogen – stored sugar in muscles and liver. It can be broken down into energy.

An injury to him/her

During Exercise

Proper nutrition prevents a muscle from being overworked.

It is a sign of more than just digestion. It is all at once a water event.

After Exercise

It is a sign to reload a muscle. The amount of time and duration of a schedule can be a sign.

After the first 30 minutes for every person we need 50g of carbs every hour.

If the day or so, has enough glycogen since it is repairing.

What are

The making of

Glucose – a simple form of sugar that the body converts into energy.
Glycogen – sugar stored in liver and muscle cells, which can be broken down to glucose for energy.

A small snack one to two hours before doing vigorous exercises is ideal. If time is limited, it is recommended to consume something lighter. Food products with high content of simple sugars (i.e., glucose) consumed right before an exercise will rapidly supply the body with energy but it will also drop significantly at the middle of the session. Low levels of glucose during exercise will trigger early onset of fatigue. Food products with high fructose content has also been reported to upset the stomach during exercise.

An individual must change the timing of meals and snacks to discover which is most comfortable to him/her once the exercise has started.

During Exercise

Proper food intake during exercise increases endurance and performance, prevents an individual from getting tired easily, and gives glucose to the working muscles. The amount needed depends on the duration of the exercise.

It is advisable to eat a 30–60g of carbohydrates every hour for a heavy exercise of more than one hour. A sports drink or cereal bar is also recommended for easy digestion. Small amounts of food should be taken at intervals instead of taking it all at once. Water is also required during exercise to avoid dehydration. Consume water every 15–30 minutes and avoid waiting to get thirsty before drinking.



After Exercise

It is very important to eat after exercise to reload the body's glycogen supply. The amount of food and time depends on the duration and intensity of the exercise and the schedule of the next exercise session.

After the exercise, it is ideal to eat within the first 30 minutes with 1g of carbohydrate for every 1kg of an individual's weight. If a person weighs 50kg then he/she should take 50g of carbohydrates. It is necessary to eat every hour within 4 hours.

If there are no plans of exercise for a day or so, it is important to have a meal that has enough carbohydrate to replenish the glycogen stores. It must also have protein since it is beneficial in building up and repairing muscle tissue.

Did you know that...

Rest and sleep are very important in the repair and regeneration of tissues. While nutrition provides the body to repair and rebuild tissues, these processes takes place during rest and sleep. Having the proper rest not just maintain your body, it also makes you feel yourself at best. The best professional athletes are given proper sleep to be able to perform at their peak. Even a small deficiency of sleep decreases performance. Not just physical performance is affected by rest, it also helps in mental, social and spiritual aspects.

Experts recommend around 7–9 hours of sleep for grown-ups while an 8-hour sleep is enough average sleep. Younger people need more sleep. Being able to have a sleep is not enough, it should be an appropriate one. Here are some suggestions for an improved solid sleep:

- Stress-free, no worrying and thinking before going to sleep
- Condition yourself to have a good sleep
- Proper breathing—slow, low, small gaps in between breathing in and out
- Comfortable sleeping environment
- No TV or any distractions while in bed
- Avoid caffeine, alcohol, and hefty eating before bed sleeping

What are the effects of bad nutrition?

The purpose of recovery nutrition is to replenish fluid, electrolytes, and glycogen. It also aids in making new muscle protein and cellular components as well as promotes proper immune functions.

EATING HABITS AND WEIGHT CONTROL

Eating habit characterizes the way an individual consumes food/It relates how, why, what, and with whom an individual eat, as well as the way he/she gains, stores, uses, and discards food. Eating habit is likewise influenced by culture, religion, economic status, society, and environment.

Weight control is the process of achieving and maintaining the desired weight of an individual. The desired weight, or the best weight, is based on gender, height, and body frame (small, medium, or large). Individuals maintaining their desired weight have greater chances of being healthier than those who are overweight and underweight.

What are ways to improve eating habits?

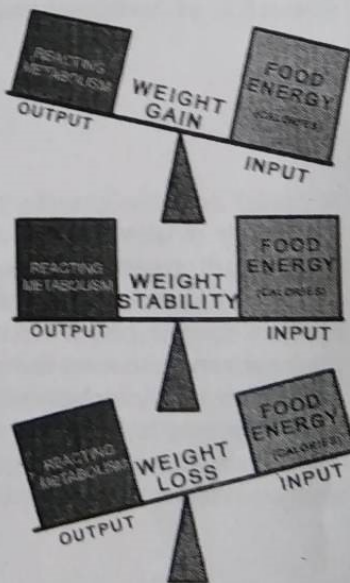
Reflect, Replace, Reinforce: A process for improving your eating habits

- **REFLECT** on all specific eating habits, both bad and good; and, identify common triggers for unhealthy eating.
- **REPLACE** unhealthy eating habits with healthier ones.
- **REINFORCE** it with new, healthier eating habits.

Source: http://www.cdc.gov/healthyweight/losing_weight/eating_habits.html

According to Centers for Disease Control and Prevention (CDC), improvement of eating habits need careful approach in which one Reflects, Replaces, and Reinforces. There are various tips available to further improve eating habits. Here are some helpful ways to improve eating disorders:

1. Writing a food diary for a number of days consisting of a list of eating habits with the specific food eaten and the time it was consumed. Thoughts and feelings when one decides to eat should also be noted in the diary.
2. Marking the habits in the list that might lead to overeating (e.g., eating too fast, eating even if not hungry, always eating dessert, and skipping meals).
3. Identifying all triggers of these unhealthy eating habits and picking a few ones that could be improved initially. The positive habits on the list should also be recognized and serve as encouragement to do more positive changes.
4. Reviewing the diary and listing the signs or cues that trigger eating other than the reason for feeling hungry. The typical feeling at those times should also be noted. Some examples of these are: watching, opening the refrigerator, seeing food, and stressed after work.
5. Reflecting on each sign or cue listed; how it could be avoided and the possibility of other healthier options if they cannot be avoided.
6. Refraining from unhealthy habits while substituting them with healthy ones. An example would be planning a healthy balanced meal ahead of time rather than eating what is readily available.
7. Sustaining the new healthy habits. Habits are formed through time and patience. It is necessary to always review the learning from the food diary.



Activity 4: Awareness Campaign

Inform the public about the pros and cons of fad diets and supplements. Choose a strategy that you will use in presenting your information.

1. Comic Strip
2. Brochure
3. Poster
4. PowerPoint Presentation

Activity 5: Find Out

1. Research about the benefits of drinking water, sports drink, and energy drink during exercise. Compare the three beverages using the table below.

Type of Beverage	Description	Benefits during Exercise
Water		
Sports Drink		
Energy Drink		

2. In your opinion, what is the best type of beverage to drink during exercise? Explain.
3. Are you going to promote sports and energy drink during exercise or physical activity?

Activity 6: Essay

Choose one topic and write an essay about it:

1. Nutrition and Exercise
2. Fad Diets for Weight Control
3. Benefits and Risks of Supplements

Activity 7: Advertisement Review

Choose one TV or print advertisement about fad diets or supplements for weight control. Make a critique about the advertisement and present it to the class.

Activity 8: Evaluation

Complete the following statements:

1. I will follow...
2. I will practice...
3. I will prevent myself from...
4. I will use...
5. I will promote ...

The essential nutrients with its corresponding importance, signs, and symptoms of deficiency in the body's immune system is summarized in Table 5.1.

Essential Nutrients	Importance	Signs and Symptoms of Deficiency
A. MACRONUTRIENTS		
Proteins	• Needed for growth, building, and repair of body tissues • Enough protein is essential to maintain muscle mass and strength, but eating more protein does not yield bigger muscle.	• Ridges or white lines in both finger and toe nails; hair loss and thinning or brittle hair; muscle deterioration
Carbohydrates	• Main source of energy • Maintains blood glucose level during exercise and replaces glycogen stores after exercise	• Irritability, nausea, bad breath, muscle cramps, excess fatigue, increase in body fat, deficit in body sodium and water, constipation, regular headaches
Fats	• Needed for immune system function and helps the body store and use vitamins • Stored fat provides enough energy for long endurance events	• Dry skin, hair loss, body weight deficiency, cold intolerance, bruising, slow growth, poor infection resistance and slow wound healing, loss of menstruation
Water	• Needed for waste removal, regulates body temperature, cushions the spinal cord and joints	• Dehydration, muscle cramps, confusion, nausea, slurred speech, and disorientation
B. MICRONUTRIENTS		
Vitamins	• Help the body use carbohydrates, proteins, and fats	
Vitamin A	• Maintains healthy skin, bones, teeth, and hair; aids vision	• Anemia, painful joints, cracks in teeth, depression, frequent infections
Vitamin B (thiamin, riboflavin, and niacin) Vitamin B6	• Important in the production of energy from carbohydrates and fats • Needed to break down glycogen to release glucose and make hemoglobin that carries oxygen in the blood	• Anemia, depression, convulsions, skin rashes • Anemia, nervous system degeneration, progressing to paralysis and hypersensitivity
Vitamin B12	• Aids in maintenance of red blood cells	• Red blood cell breakage, anemia, muscle degeneration, difficulty walking, leg cramps

Activity 2: Fill in the Chart

Answer the following:

1. List all your favorite food that you usually eat and classify whether you think it is healthy or unhealthy.

Healthy Food	Unhealthy Food

2. What are your eating habits? List them down and classify whether they are healthy or unhealthy habits.

Healthy Eating Habits	Unhealthy Eating Habits

3. Based on your answers, what will you do to achieve healthier eating habits?
4. How will you practice healthier eating habits with your family? At school?

Activity 3: My Food Program

Choose one physical activity/sport and create a one-week food program before, during, and after the activity. Use the DNG Pyramid and the *Pinggang Pinoy* as your guide in planning.

Day	Before Exercise	During Exercise	After Exercise
1			
2			
3			
4			
5			
6			
7			